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Evaluation of Supplemental Oxygen Use in the Acute Care Cardiology Unit and Opportunities for Standardizing Practice

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Background

- Administration of supplemental oxygen has potentially adverse effects in certain clinical situations
 - i.e., shunting physiology secondary to congenital heart defects^{1,2}
- The minimum amount of fraction of inspired oxygen (FiO₂) to achieve goal saturation should be used to reduce harm² (Fig. 1)
- Oxygen-air blenders may be utilized to provide lower concentrations of FiO₂ via a standard nasal cannula²
- The most recent Pediatric Acute Care Cardiology Collaborative (PAC³) Hospital Survey indicates that 88% of participants use blended oxygen but clear indications for use are not well-established^{3,4}
- A survey of local Acute Care Cardiology Unit (ACCU) nursing staff revealed:
 - Mixed uses for blended oxygen
 - Varied understanding of the current oxygen weaning orders
 - Confusion regarding weaning protocol
- Current evidence does not provide sufficient guidance for best practices related to oxygen use in patients with congenital heart disease (CHD)
- To standardize oxygen therapy & weaning, we sought to evaluate the current practice of oxygen administration in our ACCU

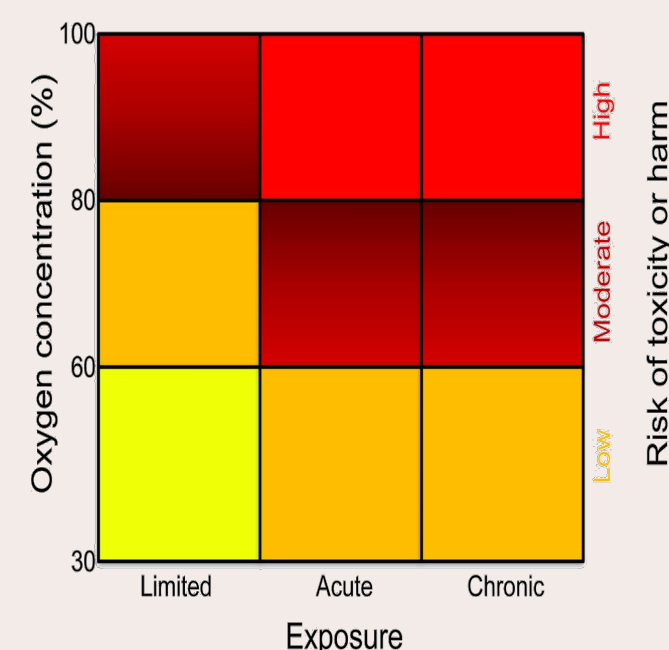


Fig 1. Speculative heat map of possible oxygen toxicity based on oxygen concentration & length of exposure².

Clinical Question

In pediatric patients with CHD, what is considered best practice with regards to supplemental oxygen administration and weaning?

Project Design

- Performed a literature review
- Analyzed current practice through survey of local ACCU staff
- Completed gap analysis & developed process map of current state
- Reviewed PAC³ hospital survey data
- Evaluated local ACCU encounters to discern percentage of those on blended oxygen versus those on 100% FiO₂

Results

- Oxygen Survey of local ACCU nursing revealed:
 - Only 22% reported having a weaning order while actively weaning
 - Varying frequency for weaning
 - Provider inconsistencies for weaning oxygen (Fig. 2)
 - Practice variation for weaning flow versus FiO₂ (Fig. 3)
- Gap analysis identified contributors to practice variation
 - Use of blenders in the cardiovascular intensive care unit (CVICU) transferring to care on ACCU
 - Knowledge gap amongst providers & staff on proper indications for blended oxygen
 - Preset weaning protocol embedded in electronic order set does not account for blended oxygen
- 14.6% of local ACCU encounters utilized blended oxygen (103/704 total patient encounters)

Do you feel that providers are consistent on whether to wean FiO₂ vs flow on a patient?

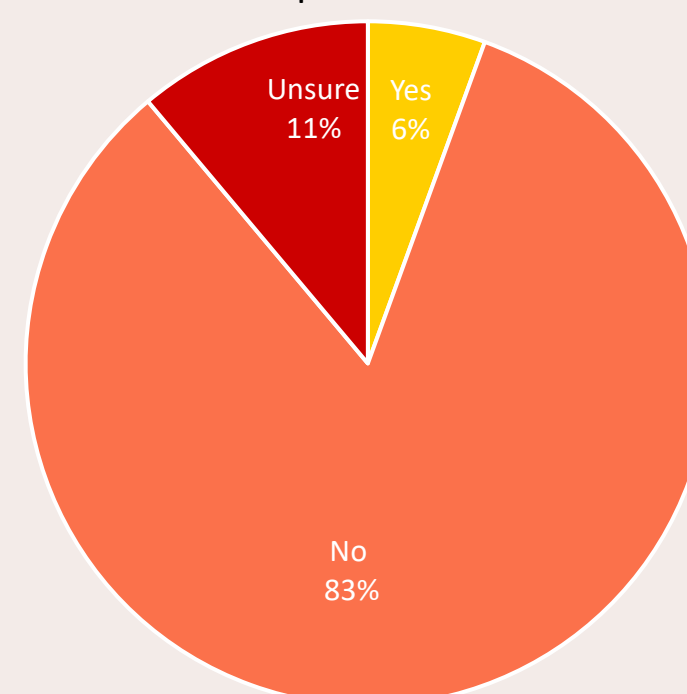


Fig 2. Survey results indicating nursing perception on provider consistency

Clinical Practice Implications

- Within acute care cardiology, there is a lack of:
 - Guidance or best practices for supplemental oxygen use
 - Standard protocol for oxygen weaning
 - Defined indications for blended oxygen
 - Understanding of potential long-term effects of oxygen toxicity
- Staff survey results demonstrated a need for improved order clarity surrounding oxygen use & weaning to:
 - Clarify indications for blended oxygen
 - Standardize weaning of blended oxygen
- To reduce practice variation, an order set delineating use of an oxygen blender should be developed
- Next steps include a follow up study with retrospective review of more detailed clinical & patient data
 - The current data did not detail the exact amount of FiO₂ utilized throughout the course of treatment, or the indication for therapy
 - The project team will utilize data to develop a standard oxygen weaning protocol based on:
 - Patient specific factors (cardiac history/diagnosis & indication for oxygen therapy)
 - Amount of FiO₂
 - Amount of flow

In your current practice, which do you attempt to wean first, FiO₂ or flow?

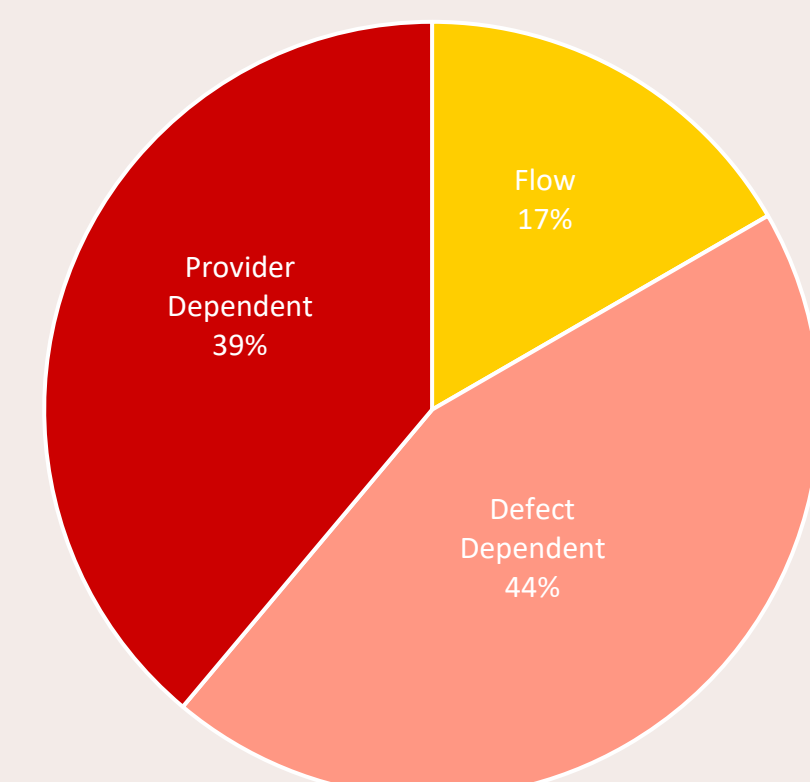


Fig 3. Survey results demonstrating variation in nursing practice